

# COPAL ELECTRONICS

SMALL SIZE PRESSURE GAUGE

## PG-35 / PG-30

CE marking  
(Compliance with EMC Standards)

Instruction Manual Ver.8.0

Thank you for purchasing a  
NIDEC COPAL ELECTRONICS CORP. product.  
In order to use the product correctly and most  
appropriately, please completely read this manual before  
use and keep it for future reference.

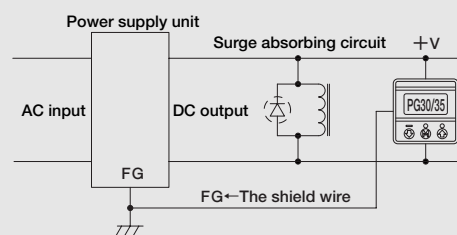
For more detailed information please ask for the nearest  
distributor or the following sales center.

## COPAL ELECTRONICS

Nishi-Shinjuku Kimuraya Bldg., 7-5-25  
Nishi-Shinjuku Shinjuku-ku Tokyo 160-0023, Japan Phone: (03) 3364-7055

## ⚠ Important Information and Warnings

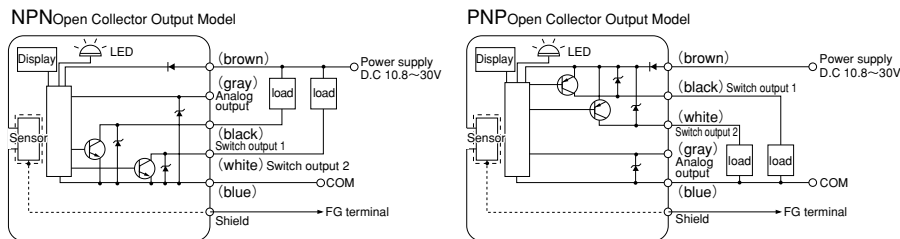
- ① Select either the PG-30 or the PG-35 depending upon the type of pressurized media.
- ② The maximum impressed pressure of the PG-30-102R at the time of vacuum break is 500kPa.
- ③ For stability, use a regulated direct current power supply.  
Surge absorbing devices (diodes, varistors, etc.) are necessary if inductive loads such as relays or solenoids are connected to the same circuit as the PG-30/PG-35.  
If using a DC power supply unit such as a switching power supply, the FG terminal should be earthed. Do not wire in parallel to high tension cables or power lines, or use cable ducts which contain high tension cables or power lines.
- ④ Be careful not to crimp any wires during handling, or put any pressure on the display area of the main body while assembling piping. The fitting torque of sealing screws and M5 fitting screws should be 3.0N·m maximum.
- ⑤ Use pH neutral detergents to clean the body. Do not use solvents such as thinners.
- ⑥ This product is dust proof and drip proof (to IP65 of IEC standards) and is not suitable for use in environments requiring higher standards.
- ⑦ Do not use pointed objects such as pens to press the setting buttons on the display panel, as this may push holes in the setting buttons and damage them.
- ⑧ Do not insert wires, etc. in the pressure port, as this may damage the internal diaphragm and cause malfunctioning.
- ⑨ PG-35 G3/8 type:  
Do not touch or scratch the diaphragm at the edge of the fitting, as this may alter the performance characteristics or damage the diaphragm, and cause malfunctioning.
- ⑩ PG-35 gasket type:  
Do not touch or scratch the edge of the fitting, as this may damage the sealing and cause leakage.
- ⑪ The PG-30/35 series do not have an explosion proof structure. Do not use it for the detection of flammable gases.
- ⑫ When analog output is supplied to a noise-sensitive device, a low-pass filter is requested in a customer's circuit.
- ⑬ Counter measures for noise interference.  
Please connect the shielded wire of this product to FG terminal of the power line. (The shield wire is connected with the metal part inside of the product.)



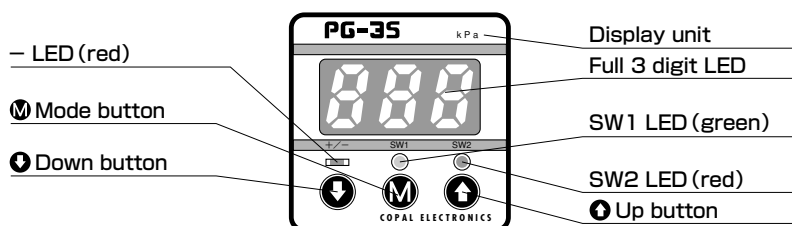
Specifications

Model	PG-35			PG-30			
	102R	103R	102A	101R	102R	103R	
Type	Gauge pressure			Absolute pressure			
Rated pressure range	-100~100kPa	-100~1000kPa	0~100kPa (abs)	-10~10kPa	-100~100kPa	-100~1000kPa	
Maximum pressure	200kPa	2000kPa	200kPa (abs)	20kPa	200kPa	1500kPa	
Break-down pressure	300kPa	3000kPa	300kPa (abs)	50kPa	500kPa	2000kPa	
Acceptable media	Liquids or gases that do not corrode SUS316L			Non-corrosive gases			
Operating voltage	10.8~30VDC (including ripple)						
Current consumption	50mA maximum						
Switch outputs	Two outputs NPN/PNP: Transistor open collector Switch rating: 30VDC/100mA maximum Residual voltage: 1.2V maximum (NPN)/2.2V maximum (PNP) at 100mA.						
	Hysteresis: 0~300 counts setting (adjustable)						
	Repeatability: ±0.2%FS±1digit						
	Response: Approx.5ms(Digital Filter: "F-0")						
Short circuit protection: Exists							
Analog output	Output voltage 1~5V / Pin(L)~Pin(H), Output impedance:10kΩ, Resolution:1/204 Only R/G mode is available on 103R, Only G mode is available on 102A.						
	Output mode: Pressure range Pin (L) ~Pin (H)						
	R	-100~100kPa	-100~1000kPa	0~100kPa (abs)	-10~10kPa	-100~100kPa	-100~1000kPa
	G	0~100kPa	0~1000kPa	0~100kPa (abs)	0~10kPa	0~100kPa	0~1000kPa
	V	0~100kPa			0~10kPa	0~100kPa	0~100kPa
Output mode	Output voltage accuracy Vzero (upper) /Vspan (Lower) (Vzero:Pin=0, Vspan:Pin=0~Pin(H))						
	R	3±0.2V 2±0.2V	1.36±0.2V 3.64±0.2V		3±0.2V 2±0.2V	1.36±0.2V 3.64±0.2V	
	G	±		1±0.2V 4±0.2V			
	V	1±0.2V 4±0.2V			1±0.2V 4±0.2V		
Display	Full 3 digit LED display (display cycle:4 times per second)						
	Negative pressure display: - LED is lit						
Display accuracy: ±1%FS							
Operation display: SW1 LED (green) and SW2 LED (red) light up when switch outputs are ON							
Operating conditions	IP protection: Meets IP65 (pressure gauge main body) of IEC						
	Operating temperature: -10 ~50°C (storage -20~70°C)						
	Operating humidity: 35~85% RH						
	Insulation resistance: 100MΩ minimum at DC500V between bundled leads and pressure port						
	Dielectric strength: One minute at AC500V between bundled leads and pressure port (1mA maximum leakage)						
	Vibration resistance: 10~500HZ 1.5mm maximum/98.1 <sup>m</sup> /s <sup>2</sup> , three directions, two hours each						
	Shock resistance: 490m/s <sup>2</sup> , three directions, three times each						
EMC: EN5501 Group 1, Class B / 1998 EMS: EN61326-1 / 1997: The permissible change of display counts, set value of switch output and zero / span voltage of analog output during the test not exceed ±5%FS.							
Thermal error: ±3%FS (0~50°C)							
Fitting part types: R1/4, G3/8, G1/4, gasket fitting 9/16-18UNF			Aluminum die-cast Rc1/8				
Materials at pressure receiving area: SUS316L							
Net Weight: Approx. 150g (incl. 2m cable)			Approx. 80g (incl.2m cable)				
Accessories: O-ring(G3/8:P18,G1/4:P15)			Plastic sealing screw, M5 fitting screw				

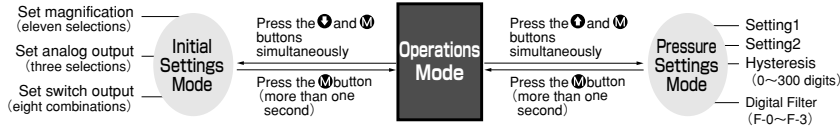
Output Electrical Diagram (Wire colors correspond to IEC standards)



Function Names

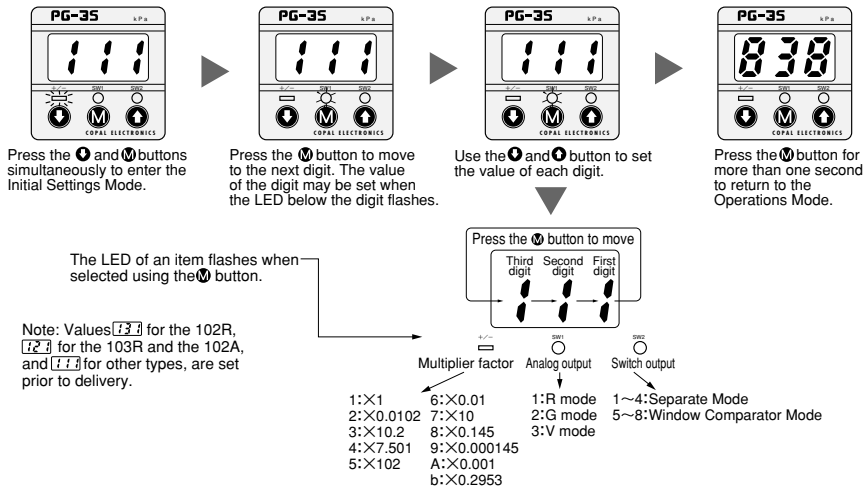


# Operating Procedures



When the power is switched on, the Operations Mode is automatically selected. Settings remain in effect after switching off the power.

## Initial Settings Mode



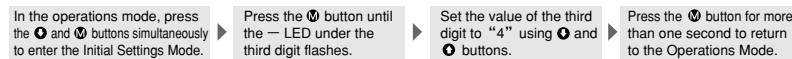
## Multiplier factor Setting

The multiplier factor setting is determined by the value of the third digit : the red —LED should be flashing during the setting.

Multiplier factor	Pressure range(-Pr~+Pr)			
	101R	102R	103R	102A
1 X1	-9.99~9.99	-99.9~99.9	-100~999	0.0~99.9 (abs)
2 X0.0102			-1.02~9.99	
3 X10.2	-99.9~99.9	-999~999		0~999 (abs)
4 X7.501	-75.0~75.0	-750~750		0~750 (abs)
5 X102	-999~999			
6 X0.01			-1.00~9.99	
7 X10	-99.9~99.9	-999~999		0~999 (abs)
8 X0.145	-1.45~1.45	-14.5~14.5	-14~145	0.0~14.5 (abs)
9 X0.000145				
A X0.001			-0.10~1.00	
b X0.2953	-2.95~2.95	-29.5~29.5	-29~295	0.0~29.5 (abs)

Sections containing an oblique stroke are multiplier factor that cannot be selected because of resolving power or display digits. (Values will not be displayed automatically.)

An example of setting "4".



Note: "1" is set prior to delivery.

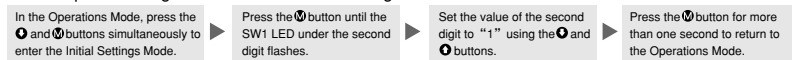
※Change of magnification setting is effective only for pressure reading. Set values for switching are not scaled automatically.

## Analog Output Setting

The analog output setting is determined by the value of the second digit: the green SW1 LED should be flashing during the setting.

Value selected	Mode	Pressure range		
		-Pr	0	+Pr
1	R mode (Compound pressure output)	1V	(Vzero)	5V
2	G mode (Positive pressure output)		1V	5V
3	V mode (Negative pressure output)	5V	1V	

An example of setting the R mode in the 102R range.



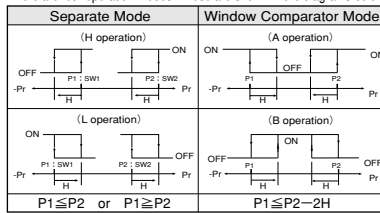
Notes: V mode for 102R and R mode for 101R are set prior to shipment. R/G mode for 103R and G mode for 102A can only be selected.

## Switch Output Setting

The switch output setting is determined by the value of the first digit : the red SW2 LED should be flashing during the setting.

Value selected	SW1 output				SW2 output			
	Separate		Window comparator		Separate		Window comparator	
	H	L	A	B	H	L	A	B
1	○				○			
2		○				○		
3			○				○	
4				○				○
5								
6		○				○		
7			○				○	
8				○				○
	Setting 1		Minimum: Setting 1 Maximum: Setting 2		Setting 2		Minimum: Setting 1 Maximum: Setting 2	
	Note 1		Note 2		Note 1		Note 2	

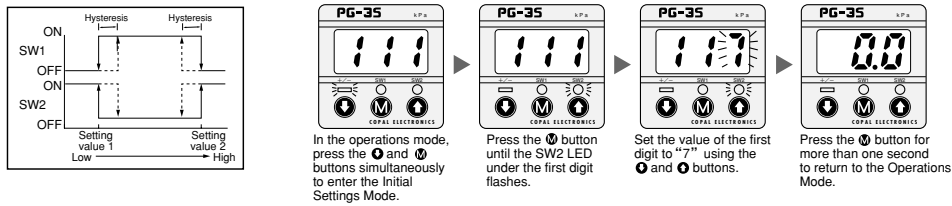
There are four operation modes. These are shown in the diagrams below.



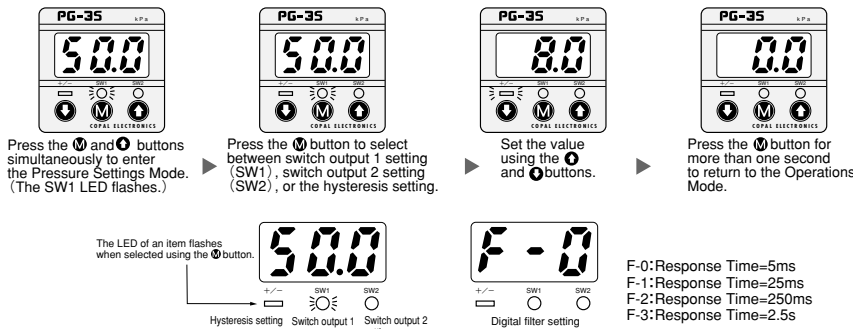
Note 1. In the Separate Mode, setting 1 corresponds to SW1, and Setting 2 corresponds to SW2.  
 Note 2. In the Window Comparator Mode, the minimum value for SW1 and SW2 corresponds to Setting 1 and the maximum value corresponds to Setting 2.

## Window Comparator Mode

An example of setting the value "7" for the mode shown in the diagram.

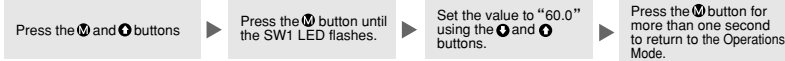


## Pressure Settings Mode



## Switch Output Setting

To set switch output 1 the SW1 LED should be flashing. (To set switch output 2 the SW2 LED should be flashing.)  
 An example of setting 60kPa for switch output 1 (SW1 LED is flashing) with 102R.



Note: +50%F.S. is set prior to delivery.

## Hysteresis Setting

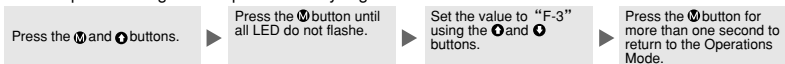
To set hysteresis the "—" LED should be flashing.  
 An example of setting a hysteresis value of 8.0kPa with the 102R (kPa).



Note: 20digits is set prior to delivery.

## Digital Filter Setting

To set Digital Filter all LED should be not flashing.  
 An example of setting 2.5s response time by Digital Filter.



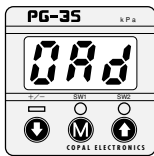
Note: "F-0" is set prior to delivery.

## Troubleshooting

■ If the following error messages are displayed, follow the procedures in the table.

Display and problem	Cause	Solution
<b>E - 1</b>	Output current is exceeding 100mA.	Turn off the power and verify the load connected switch output 1 and 2.
<b>E - 2</b>	Pressure was applied at the zero point adjustment.	Press M button and return the applied pressure to the atmospheric pressure and try zero-point adjustment again.
<b>E - 3, E - 4</b>	Failure of the internal circuit.	Please contact us. Please use a regulated DC power supply and measures for the power line noise.
<b>999</b> Flashing	Pressure values exceed the display range.	Normal state
Flashing of the pressure value	Pressure values exceed the rated pressure range. (110%FS)	Normal state
Black out of the display	Non-display mode	Normal state (See Non-display mode.)
Disable the key operation	Key protection mode	Normal state (See Key protection mode.)

## Zero point Adjustment



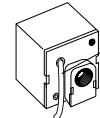
Pressing **0** the **0** and buttons simultaneously in the Operations Mode displays **0.00** on the screen. One second later this change to **0** than the **0** and **0** buttons are released. (If the pressure port is opened to the atmosphere.)

Note:102A mode Zero point is adjusted prior to delivery.(0.3kPa abs max.)

## Others

### ■ Tube at atmospheric pressure intake

If there is any possibility that the sensor may become wet with oil or water, which may enter the case through the air intake, connect a silicon tube, or similar, to the intake and position the end of the tube in a suitably safe place. Be sure not to bend the tube or block the end of the tube.



Example of a tube with external diameter of  $\phi 4$  and internal diameter of  $\phi 2.5$

### ■ Piping

Use a wrench (13mm) on the aluminum die-casting. Do not hold the plastic case when tightening. Apply sealing tape at the male screw area to protect against air leaks. If mounting with an angled bracket, the maximum torque of the M3 screws should be less than 0.3N·m.

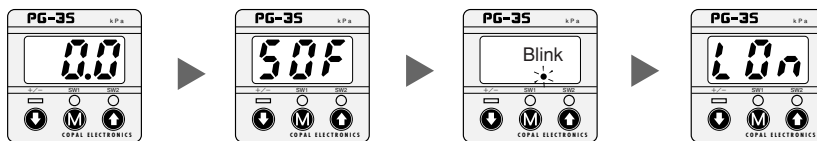
When using the accessories sealing or fitting screw, bind up the seal tape around the sealing screw one and a half or two turns, and screw it in the pressure port by hand without damaging the screw thread. After then, tighten the screw sufficiently with wrench. (Recommended torque:Plastic screw 3.0N·m, Metal screw 10.0N·m)

### ■ Non-Display Mode

#### <Non-Display [Temporary] Mode>

- When the keys are not operated for more than 10 seconds during Operation Mode,the system will automatically select Non-Display [Temporary] Mode and the display will turn off.
- Decimal point LED shown in the figure below will blink during Non-Display [Temporary] Mode.
- Using the EEPROM,the PG-30/35 series can retain preset values even if the power is turned off.
- If an error message is detected,the display will comeback and show the error message.
- You can change any functions during Non-Display [Temporary] Mode.

(How to set)

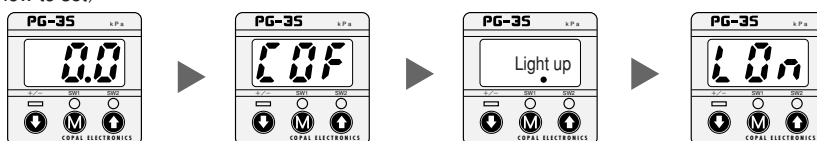


- To enable Non-Display [Temporary] Mode, press **0** key for more than 4 seconds. **5.0F** will be displayed and Non-Display [Temporary] Mode will be set. After 10 seconds, display will go off.
- To disable Non-Display [Temporary] Mode, press **0** key for more than 4 seconds. **1.0n** will be displayed and Non-Display [Temporary] Mode will be canceled.

#### <Non-Display [Full-time] Mode>

- In Non-Display [Full-time] Mode, the display will be turned off and the Keys will be locked.
- Decimal point LED shown in the figure below will light up during Non-Display [Full-time] Mode.
- Using the EEPROM, PG-30/35 series can retain the preset values even if the power is turned off.
- If an error message is detected, the display will comeback and show the error message.
- You cannot change any functions during Non-Display [Full-time] Mode.

(How to set)



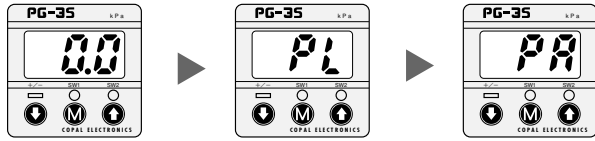
- To enable Non-Display [Full-time] Mode,press **0** key for more than 4 seconds. **0.0F** will be displayed and Non-Display [Full-time] Mode will be set.Display will turn off in a second.
- To disable Non-Display [Full-time] Mode,press **0** key for more than 4 seconds. **1.0n** will be displayed and Non-Display [Full-time] Mode will be canceled.

## ■ Key Protection Mode

### <Key Protection Mode>

- Key Protection Mode is used to lock the front panel key in order to prevent preset values from being accidentally changed.
- Using EEPROM, the PG-30/35 series can retain the preset values even if the power is turned off.

(How to set)

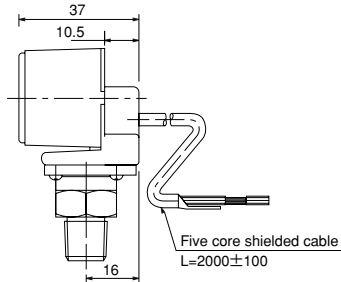
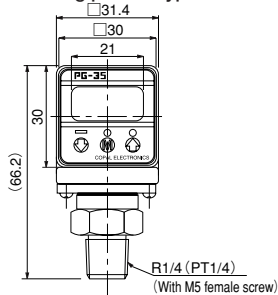


- To enable Key Protection Mode, press **M** key for more than 4 seconds. **PL** will be displayed and the keys will be locked.
- To disable Key Protection Mode, press **R** key for more than 4 seconds. **PR** will be displayed and the keys will be unlocked.

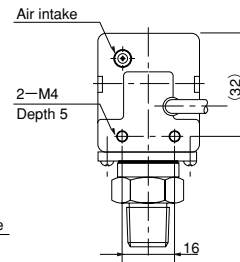
## Outline Dimensions

### ■ PG-35 Outline Dimensions

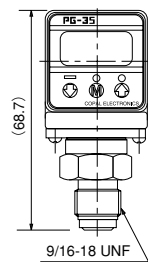
Fitting part: R2 type



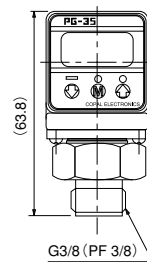
Unless otherwise specified tolerance : ±0.5 (Unit:mm)



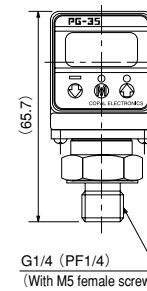
Fitting part: VC type



Fitting part: GF type

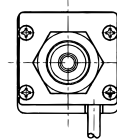
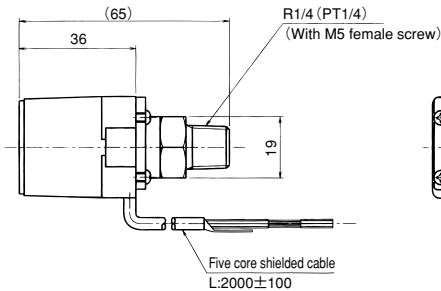
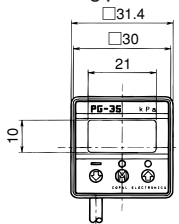


Fitting part: G2 type

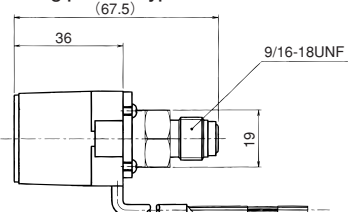


### ■ PG-35-B Outline Dimensions

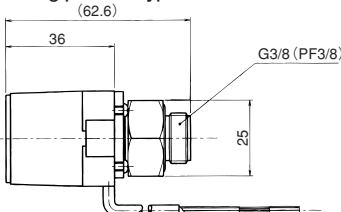
Fitting part: R2 type



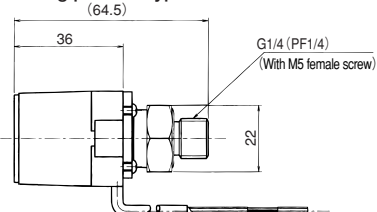
Fitting part: VC type



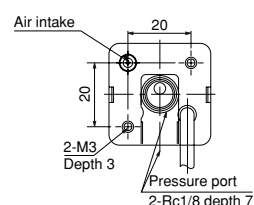
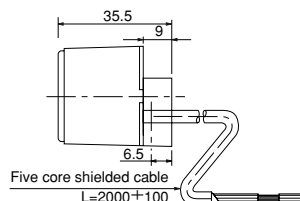
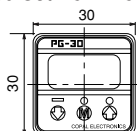
Fitting part: GF type



Fitting part: G2 type

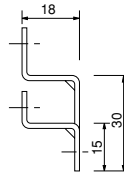
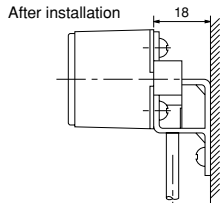
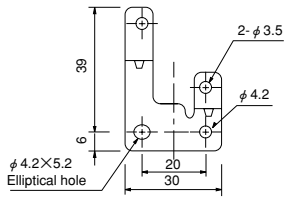


### ■ PG-30 Outline Dimensions

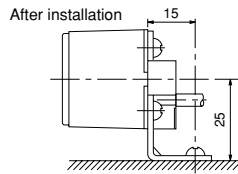


Brackets (Option)

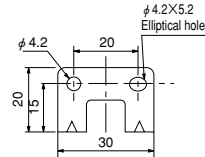
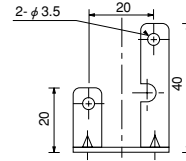
■ PG30 bracket for wall attachment (sold separately)



Material: SUS  
t=1.6

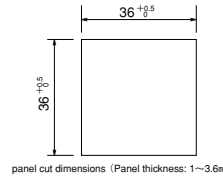
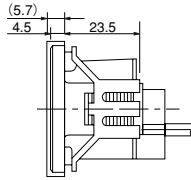
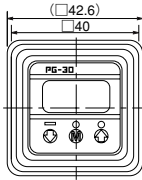


■ PG-30 bracket for floor attachment (sold separately)

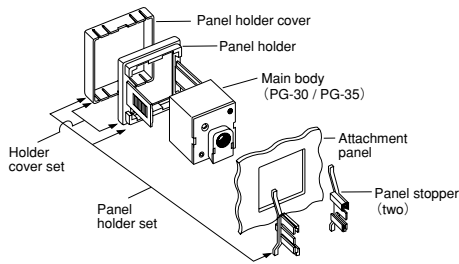


Material: SUS  
t=1.6

■ PG-35/PG-30 Panel holder set • holder cover (sold separately)



Panel holder set



■ Accessories (Sold separately)

Product name	Model no.	Description	Applicable model
Bracket for wall attachment	ACPG-001	Bracket for wall attachment, two M3×4 male screws	PG-30
Bracket for floor attachment	ACPG-002	Bracket for floor attachment, two M3×4 male screws	PG-30
Panel holder set	ACPG-003	Panel holder cover, panel holder, two panel stoppers	PG-30 PG-35
Holder cover set (for protection of gauge sides)	ACPG-004	Panel holder cover, panel holder	PG-30 PG-35

Warranty

This product can be covered by one-year warranty. COPAL ELECTRONICS warrants that any part of the product which proves to be defective due to the design and/or manufacturing of COPAL ELECTRONICS within one year from the date of delivery will be repaired or replaced, free of charge. Note that the warranty will only be applied to the product alone, not to damages induced by any failure of the product.

The warranty will not be applied in any of the following cases:

- ① Failure and damage caused by improper use not conforming to the instruction manual or negligent handling.
- ② Failure and damage caused by inappropriate modification, adjustment or repair.
- ③ Failure and damage caused by natural disaster, fire or other act of God.

Model Numbers

